compound. For these investigation the electronograph MGU was used. To evaporate the metal-halides a heating system was employed based on the bombardment by electrons. The apparatus and the methods used in this connection are accurately described in reference 10. All electron diffraction pictures taken: CsHal, RbHal, KaHal, NaHal, and LiHal, with the exception of the bromide and the iodide of Li showed a sinusoidal extinction in their intensity distribution. The results which were obtained by means of the theoretical spreading curves of the intensity with bi-atomic molecules, have been compiled in a table together with other comparative data from publications (Refs 1 and 4) (Ref 1: see above, Ref 4 investigation with microwaves). The table shows the variation in the difference between the intermolecular distance Me-X for the said metal-halides of the values Ref 4 and of the present investigation; from 0.04 Å (Cs, Rb-salts) to 0.15 Å (Li-salts). This variation has been ascribed to the association of the molecules in the vapor. The effective intensity of the electron scattering would be composed of the scattering of the monomers and of the associates (Me_2X_2). On the basis of the theoretical curves having a certain content of monomers and dimers (see also Fig 1), and of

the known distances Me-X=r in the monomers and dimers the real distance r=eff can be determined, and thus also (Fig 2) the degree of the dimerization. The difference of the results in the three investigations compared, is explained by the different dimerization degree of the vapors investigated, this difference being due to the various sections of the evaporating process in which the electron diffraction pictures were taken. The geometrical configuration of the individual atoms in the dimers of the examples Li_2F_2 and Li_2Br_2 and Li_2J_2 has been determined by way of the comparison of the theoretical spreading curves for various distances r(X-X) with the experimental spreading curves (see Figs 4, 5,6). It is only regrettable that this method does not permit the safe determination of all three parameters of a dimer Me-Me, Me-X and X-X. The values obtained are the following: r(Li-Br)=2.35 Å, r(Br-Br)=3.85 Å, ∠Br-Li-Br=110 ± 4°, r(Li-J)=2.54 Å, r(I-I)=4.30 Å, ∠I-Li-I=116 ± 4°; r(Li-F)=1.68 Å, r(F-F)=2.67 Å. There are 6 figures, 1 table, and 12 references, 3 of which are Soviet.

Electronographic Investigation of the Structure of the Molecule of the Vaporous Halides of Basic Elements SOV/55-58-6-28/31

ASSOCIATION: Kafedra fizicheskoy khimii (Chair for Physical Chemistry)

SUBMITTED: July 19, 1958 - October 4, 1958

Card 4/4

SOV/78-3-12-2/36

AUTHORS: Gorokhov, L. N., Khodeyev, Yu. S., Akishin, P. A.

TITLE: Mass Spectrometric Investigation of the Sublimation of Sodium Chloride (Mass-spektrometricheskoye issledovaniye sublimatsii khlorida natriya)

PERIODICAL: Zhurnal neorganicheskoy khimii, 1958, Vol 3 Nr 12, pp 2597-2598 (USSR)

ABSTRACT: The sublimation of sodium chloride was investigated using the mass spectrometric method. The $NaCl^+$ and Na_2Cl^+ ions were found in the mass spectrum, and at temperatures in the region of the melting point trace amounts of the $Na_3Cl_2^+$ ion were detected. These last ions form by a secondary reaction mechanism. In the temperature range 834-903°K, the average of the ratio $J_{NaCl^+}/J_{Na_2Cl^+} \cong 2$. Using the relationship $\lg(J_{Na_2Cl^+} \cdot T) - 1/T$ the heat of sublimation of the dimer form of the sodium chloride $\Delta H_2 = 55.3 \pm 1.0$ kcal/g mol was computed. The dissociation energy of the dimer form is $\Delta E = 45.6 \pm 1.8$ kcal. The results obtained

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Mass Spectrometric Investigation of the Sublimation of Sodium Chloride

for ΔH_1 and ΔH_2 agree with the data of the publications. The values for ΔH_1 and ΔH_2 are 51.1 and 55.5 kcal/mol, respectively. There are 10 references, 3 of which are Soviet.

SUBMITTED: December 3, 1957

Card 2/2

AUTHORS: Akishin, P. A., Rambidi, N. G. SOV/78-3-12-3/36

TITLE: Electronographic Investigation of the Structure of the Cesium Halide Molecules (Elektronograficheskoye issledovaniye stroyeni ya molekul galogenidov tseziya)

PERIODICAL: Zhurnal neorganicheskoy khimii, 1958, Vol 3, Nr 12, pp 2599-2602 (USSR)

ABSTRACT: The structure of the cesium halides in the vapor state was investigated using the electronographic method. The electronograms of the cesium halide vapors show similar distribution and intensity of electron dispersion. Theoretical plots of the intensity of the electron dispersion were calculated for the diatomic CsX molecule using the following simplified equations: $I_{mol} = \frac{\sin sr}{s.r}$; $s = \frac{4\pi}{\lambda} . \sin \frac{\vartheta}{2}$; The calculation of the distance between the two atoms in these molecules of cesium halide was carried out using the method of approximation. These calculations yielded the following results for the atomic separations in the cesium halide molecules: CsF = 2.335±0.019 Å, CsCl = 2.906±0.13 Å, CsBr = 3.081±0.008 Å and CsJ = 3.307±0.015 Å. The results for the inter-atomic

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SOV/78-3-12-3/36

Electronographic Investigation of the Structure of the Cesium Halide Molecules

distances in the CsX molecules (X = F, Cl, Br, J) obtained with the electronographic method agree well with those obtained using the micro-wave spectra. The results were reproducible with an accuracy of 0.010 Å.
There are 3 tables and 9 references, 3 of which are Soviet.

SUBMITTED: December 3, 1957

Card 2/2

AKISHIN, P.A.

AUTHORS: Akishin, P. A., Spiridonov, V. P., Sobolev, G. A., Naumov, V. A. 76-1-8/32

TITLE: Studies of Molecular Structure by Electron Diffraction. VIII. Barium Halides (Elektronograficheskoye issledovaniye stroyeniya molekul. VIII. Galogenidy bariya).

PERIODICAL: Zhurnal Fizicheskoy Khimii, 1958, Vol. 32, Nr 1, pp. 58-61 (USSR)

ABSTRACT: For the first time the hitherto in literature lacking data on the configuration and the geometric parameters of the molecules of all vaporous halides of barium are obtained. That is to say of barium fluoride, barium chloride and barium iodide. The taking of electronograms was carried out by means of an apparatus with an evaporator for high temperatures according to the method used by the authors of earlier works (ref. 1 to 6). The evaluation of electronograms was carried out according to two methods: the radial distribution according to the variant of Uolter-Bich and that of consecutive approximations. With the evaluation according to the second method the authors established that the distribution of the intensity of stray electrons of the barium halide vapors, observed experimentally is well represented by the theoretical

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intensity curves I(s) (which had been calculated on the condition of a linear configuration of the barium halide molecules). The asymmetry of the rings on the electronograms of barium halide vapors in less marked than with those of the corresponding halides of calcium and strontium (ref. 5,6). Because of the greater charge value of the barium nucleus compared with the charges of calcium- and strontium nuclei, the valence angle in the molecules of barium halides according to the method of consecutive approximation can be determined only less exact than with the molecules of halides of calcium and strontium.- In the case of all compounds investigated a linear molecular structure was stated and the values of the intermolecular distances were found. The error in the determination of these distances Ba- X is $\pm$1- 1,5 %. The authors stated that the interatomic distance Ba-X in chloride-, bromide- and iodide molecules changes approximatively according to the linear law in dependence on the ordinal number of the halide, while the distance Ba-F deviates strongly from this regularity.

Studies of Molecular Structure by Electron Diffraction. 76-1-8/32
VIII. Barium Halides

There are 2 figures, 5 tables, and 7 references, 6 of which are Slavic.

ASSOCIATION: Moscow State University imeni M. V. Lomonosov (Moskovskiy gosudarstvennyy universitet im. M. V. Lomonosova).

SUBMITTED: September 13, 1956

AVAILABLE: Library of Congress

Card 3/3

AUTHORS: Akishin, P. A., Spiridonov, V. P., Khodchenkov, A. N. SOV/76-32-7-38/45

TITLE: On the Electron Diffraction Investigations of the Molecular Structure of the Halides of Bivalent Tin and Lead (K voprosu ob elektronograficheskom issledovanii stroyeniya molekul galogenidov dvukhvalentnykh olova i svintsa)

PERIODICAL: Zhurnal fizicheskoy khimii, 1958, Vol. 32, Nr 7, pp. 1679 - 1681 (USSR)

ABSTRACT: According to quantum chemical concepts a triangular configuration may be assumed for the molecules SnX_2 and PbX_2, and a tetrahedric structure for the molecules SnX_4 and PbX_4. While, on the hand, reliable experimental information on the structure of the latter two is known to exist, the problem of the structure of the former two has not yet been solved. Investigations carried out by Lister and Sutton (Ref 4) which were checked by the authors of this paper according to the equation by Schomaker (Ref 6) using the data obtained by the former, proved to be insufficient. For this reason the experiments were repeated, using a more perfect apparatus and method of determina-

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tion. According to the experimental results obtained the following was found: The electron diffraction investigations of the gaseous halides of SnX_2 and PbX_2 make possible the determination of the inter—atomic distance metal - halide, however, not that of the molecule configuration. It must be taken into account that molecules of the types MeX, Me_2X_2, Me_2X_4, and others are contained in the vapors. The problem of the molecular composition of the vapor could be solved by the use of mass spectrometric methods, and that concerning the molecular configuration by radiospectroscopic methods. There are 1 figure, 1 table, and 7 references, 2 of which are Soviet.

ASSOCIATION: Moskovskiy gosudarstvennyy universitet im. M.V.Lomonosova (Moscow State University imeni M.V.Lomonosov)

SUBMITTED: October 17, 1957

On the Electron Diffraction Investigations of the Molecular Structure of the Halides of Bivalent Tin and Lead SOV/76-32-7-38/45

1. Lead halides--Molecular structure 2. Tin halides--Molecular structure
3. Electron diffraction analysis--Applications

Card 3/3

AUTHORS: Akishin, P. A., Spiridonov, V. P. SOV/76-32-7-39/45

TITLE: The Electron Diffraction Investigation of the Molecular Structure of MgJ_2 (Elektronograficheskoye issledovaniye stroyeniya molekuly MgJ_2)

PERIODICAL: Zhurnal fizicheskoy khimii, 1958, Vol. 32, Nr 7, pp. 1682 - 1683 (USSR)

ABSTRACT: After the three other halides of magnesium had been investigated in the previous paper the authors in this paper gave the results of the investigation of MgJ_2. The substance to be investigated was obtained by the action of iodine vapors on powdery magnesium metal in vacuum under heating. The new electronograph was used and the authors worked according to the method already described, the electronograms obtained being evaluated according to the method of consecutive approximations and the radial distribution in variants. The electronograms taken show up to 8 interference rings of a certain intensity distribution, which is given; the maxima of intensity drop uniformly together with the angle of scattering. The corresponding graphs as well as a table containing the single values obtained are given. The following

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The Electron Diffraction Investigation of the Molecular Structure of MgJ_2 SOV/76-32-7-39/45

geometrical parameters are given for the MgJ_2 molecule in correspondence with the results of the investigation:

$r_{(g-J)} = 2,52 \pm 0,03$ Å

$\angle J - Mg - J = 180 \pm 30^{\circ}$

There are 2 figures, 1 table, and 5 references, 5 of which are Soviet.

ASSOCIATION: Moskovskiy gosudarstvennyy universitet im. M.V.Lomonosova (Moscow State University imeni M.V.Lomonosov)

SUBMITTED: November 27, 1957

Card 2/3

The Electron Diffraction Investigation of the Molecular Structure of MgJ_2 SOV/76-32-7-39/45

1. Magnesium iodide--Molecular structure 2. Magnesium iodide--Electron diffraction analysis

Card 3/3

AUTHORS: Akishin, P. A., Vilkov, L. V., Tatevskiy, V. M. 20-1-33/58

TITLE: Electron Diffraction Study of the Chloroprene Molecule (Elektronograficheskoye issledovaniye stroyeniya molekuly khloroprena).

PERIODICAL: Doklady AN SSSR 1958, Vol. 118, Nr 1, pp. 117-120 (USSR)

ABSTRACT: The task of the present work is the determination of the spacial configuration and the geometric parameter of the chloroprene molecule by means of the method of the diffraction of quick electrons with a vapour jet of the substance to be investigated. The apparatus for the taking of electronograms was already described in a preliminary work (ref. 1). With long waves of electrons of from 0,0520 to 0,0540 Å 7 series of electronograms were obtained. With these electrons 8 maxima and 7 minima were measured by means of visual evaluation of their intensity. From the experimental data obtained and given in a table the curve of radial distribution was constructed. The calculation made with a variation of the values of the intensity of the extremes proved the reliability of the curve of radial distribution. The attachment of the peaks of the curve of radial distribution to interatom distances in the chloroprene molecule arranged by the authors is

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mentioned here. Then the theoretic curves of intensity of various models (the structure parameters of which are mentioned in a table) are calculated according to the method of successive approximation. Not with all models the theoretic intensity curves coincide with the experimental curve of scattered electrons. This non-coincidence exists e.g. for the plain transisomer, the plain zis-isomer as well as for the rotated isomer with a rotation of the vinyl-groups by 90° around the $C_2 - C_3$ group. The best coincidence is obtained for the plain model of the chloroprene molecule with transposition of double compounds and $C_1C_2C_3$- and $C_2C_3C_4$- angles differing by 5°, as well as for the non-plain model of the molecule with a rotation of the vinyl-groups around the only C_2-C_3-compound by 32° (rotation from the trans-position) and with equal $C_1C_2C_3$- and $C_2C_3C_4$- angles. The main parameters of the two latter models coincided completely with the interatom distances obtained from the curve of radial distribution. The two most probable structures resulting from the electronographic investigation of the structure of the chloroprene molecule are given with their numeric parameters. The double carbon compounds in the chloroprene molecule have a transfiguration or a similar configuration, which coincides with

Electron Diffraction Study of the Chloroprene Molecule. 20-1-33/58

the earlier obtained infrared- and ultraviolet spectra of chloroprene. There are 3 figures, 2 tables, and 11 references, 3 of which are Slavic.

ASSOCIATION: Moscow State University imeni M. V. Lomonosov (Moskovskiy gosudarstvennyy universitet imeni M. V. Lomonosova).

PRESENTED: January 3, 1957, by N. N. Semenov, Academician.

SUBMITTED: December 29, 1956

AVAILABLE: Library of Congress

Card 3/3

20-118-5-35/59

AUTHORS: Akishin, P. A. , Rambidi, N. G.

TITLE: Electronodiffraction Study of Lithium Oxide (Elektronograficheskoye issledovaniye stroyeniya molekuly okisi litiya)

PERIODICAL: Doklady Akademii Nauk SSSR, 1958, Vol. 118, Nr 5, pp.973-976 (USSR)

ABSTRACT: In the present work the geometric structure of the Li_2O molecule is determined experimentally by means of the method of diffraction of fast electrons on a vapor jet of the material to be investigated. Experiments were carried out with the electronodiffraction equipment of the Moscow State University for the investigation of the structure of the molecules of not volatile compounds. The vapor jet of the material to be investigated was produced by means of a high temperature vaporizer with heating of the ampule by electron bombardment. Lithium oxide was vaporized from a molybdenum ampule at temperatures of $\sim$1300 to $\sim$1350°C. The electronographs of the vapors were recorded on photographic plates. The lithium

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Electronodiffraction Study of Lithium Oxide

oxide preparation (purity 99,62 %) used here was produced by thermal decomposition of lithium nitrate in a silver crucible. 7 series of electronographs each/with 2 - 3 recordings of different wave lengths of the electrons (within the values λ = 0,0443 and λ = 0,0488 Å) were produced from the vapors of lithium oxide. The electronographs of the vapors had 3 to 4 distinct interference rings each, in the case of which intensity distribution of the scattered electrons in the diffraction pattern differs only little from a damped harmonic function. These electronographs were then elaborated by means of the method of the radical distribution and the method of successive approximations. Starting with the triangular model of the lithium oxide molecule with an angle of 110° between Li - O - bindings the value r(Li - O)= = 1,82 ± 0,02 Å of the interatomic distance Li - O is found by the method of successive approximations. Comparing the here found distance of 1,82 Å in the molecule of the gaseous phase with the distance 2,00 Å of the atoms in the crystal lattice the characteristic difference of 10 % given also in the technical publications for certain compounds is found. Finally the authors compare the experimental value of the interatomic distance Li - O with the evaluation of this

Electronodiffraction Study of Lithium Oxide

distance found by various methods. There are 2 figures, 1 table, and 13 references, 5 of which are Soviet.

ASSOCIATION: Moskovskiy gosudarstvenny universitet im. M. V. Lomonosov (Moscow State University imeni M. V. Lomonosov)

PRESENTED: August 2, 1957, by N. N. Semenov, Member, Academy of Sciences, USSR

SUBMITTED: July 30, 1957

Card 3/3

AUTHORS: Akishin, P. A., Spiridonov, V. P., Sobolev, G. A. 20-118-6-24/43

TITLE: Electron Diffraction Investigation of the Structure of Beryllium Halide Molecules (Elektronograficheskoye issledovaniye stroyeniya molekul galogenidov berilliya)

PERIODICAL: Doklady Akademii Nauk SSSR, 1958, Vol. 118, Nr 6, pp. 1134-1137 (USSR)

ABSTRACT: The present paper investigates the structure of the vaporous beryllium halides - of fluoride, chloride, bromide, and iodide for which no data exist in publications on the geometrical parameters. The production processes for the individual preparations are shortly enumerated. The apparatus and the measuring methods for the detection of electronographs were described already earlier (Ref. 1). For all vaporous beryllium halides investigated here 8 - 10 series of electronographs each were taken. These electronographs had the following intensity distribution: the even (2., 4., 8., and 10.) maxima are intensive and the uneven (3., 5., 7., and 9.) have a lower intensity than the even maxima. The intensity of the even and uneven maxima decreases gradually with increasing scattering angle. The minima lying before

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Electron Diffraction Investigation of the Structure of Beryllium Halide Molecules 20-118-6-24/43

agreeing results on the configuration (i.e. in favor of the linear structure) and on the geometrical parameters of the molecules of the vaporous beryllium halides. There are 2 figures, 5 tables, and 14 references, 8 of which are Soviet.

ASSOCIATION: Moskovskiy gosudarstvennyy universitet im. M. V. Lomonosova (Moscow State University imeni M. V. Lomonosov)

PRESENTED: August 2, 1957, by N. N. Semenov, Member, Academy of Sciences, USSR

SUBMITTED: July 30, 1957

Card 3/3

AKISHIN, P. A.; VILKOV, L. V.

"Electron Diffraction Study of Some Halogenated Organic Compounds and Regularities in the Interatomic Distances Carbon - Halogen"

a report presented at Symposium of the International Union of Crystallography Leningrad, 21-27 May 1959

AKISHIN, P.A.: RAMBIDI, G.: SPIRIDONOV, P. NAUMOV, A.

"Electron Diffraction by Gases at the High Temperatures"
A report presented at the Symposium of the International Union Conference of Crystallography Lenningrad 21-27 May 1959

SO: B 3,135,471 28 July 1959

5(2) SOV/156-59-1-1/54

AUTHORS: Akishin, P. A., Naumov, V. A.

TITLE: Electronographic Investigation of the Molecular Structure of Lanthanum Halides (Elektronograficheskoye issledovaniye stroyeniya molekul galogenidov lantana)

PERIODICAL: Nauchnyye doklady vysshey shkoly. Khimiya i khimicheskaya tekhnologiya, 1959, Nr 1, pp 5 - 7 (USSR)

ABSTRACT: Five to seven series of electronograms were plotted from each lanthanum halide compound with and without the use of the s^2 sector at 40, 60, and 80 kv. The evaluation was carried out according to the methods of successive approximations and radial distribution. All curves of the radial distribution (see diagram) show two peaks. The first and higher one is interpreted as r(La-X), the second and flat one as r(X-X) (r= interatomic distance, X = F, Cl, Br, J). A flat triangular model of the compounds LaX_3 is formed by the curves of radial distribution. The results are in good agreement with the data on yttrium halogen compounds. The interatomic distances La-X in the series of Cl, Br, and J compounds change according to

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Electronographic Investigation of the Molecular Structure SOV/156-59-1-1/54
of Lanthanum Halides

the atomic number of the halogen following a linear law (see diagram). The distance La-F does not follow this law, but shows a considerably reduced value. The results of the approximate computations for lanthanum fluoride, chloride, bromide, and iodide are summarized in a table. A second table shows the determined interatomic distances of the compounds mentioned. There are 2 figures, 2 tables, and 5 references, 1 of which is Soviet.

ASSOCIATION: Kafedra fizicheskoy khimii Moskovskogo gosudarstvennogo universiteta im. M. V. Lomonosova (Chair of Physical Chemistry of Moscow State University imeni M. V. Lomonosov)

SUBMITTED: April 25, 1958

Card 2/2

24(7) SOV/156-59-2-1/48

AUTHORS: Akishin, P. A., Naumov, V. A., Tatevskiy, V. M.

TITLE: The Electronographical Investigation of the Structure of the Molecules of the Neodymium Halogen Compounds (Elektronograficheskoye issledovaniye stroyeniya molekul galogenidov neodima)

PERIODICAL: Nauchnyye doklady vysshey shkoly. Khimiya i khimicheskaya tekhnologiya, 1959, Nr 2, pp 229-232 (USSR)

ABSTRACT: In a previous investigation it was found (Ref 1) that the molecules of LaX_3 (X = halogen) have a plane configuration with the lanthanum atom in the center of an equilateral triangle. Because of the similar structure of the outer electron shells a similar configuration was to be expected in the case of neodymium. The measurements carried out by means of an electronograph of the Chemical Department of the MGU (Moskovskiy gosudarstvennyy universitet - Moscow State University) confirm this. The electronograms were read according to the method of radial distribution and according to the method of successive approximation. Figure 1 shows the curves of radial distribution. The two peaks of the curve are interpreted as r(Nd - X) and r(X - X). They were in agreement with the expected plane configuration. The RMS oscillation amplitudes were computed

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The Electronographical Investigation of the Structure of the Molecules of the Neodymium Halogen Compounds

and the theoretical curves of the scattering intensity were plotted (Fig 2) which are in good agreement with the experimentally found curves. Table 2 shows the RMS oscillation amplitudes for NdF_3, $NdCl_3$, $NdBr_3$ and NdJ_3 and the geometrical parameter. The experimentally found symmetrical configuration of LaX_3 (Ref 1), YX_3 (Ref 7) and now also NdX_3 confirm the quantum chemical assumptions (Ref 8). In the series chlorine - bromine - iodine, neodymium - halogen follow approximately a linear law, whereas the distance neodymium - fluorine is considerably reduced, as it is the case with a number of fluorine compounds. There are 2 figures, 2 tables, and 10 references, 5 of which are Soviet.

PRESENTED BY: Kafedra fizicheskoy khimii Moskovskogo gosudarstvennogo universiteta im. M. V. Lomonosova (Chair of Physical Chemistry, Moscow State University imeni M. V. Lomonosov)

SUBMITTED: October 13, 1958

AKISHIN, P.A.; GOROKHOV, L.N.; SIDOROV, L.N.

Mass-spectrometric study of the evaporation of sodium chloride and lithium fluoride with the aid of a double effusion chamber. Vest.Mosk.un.Ser.mat.,mekh.,astron.,fiz.,khim. no.6:194-204 '59. (MIRA 13:10)

1. Kafedra fizicheskoy khimii Moskovskogo universiteta.
(Evaporation) (Alkali metal halides)
(Mass spectrometry)

PANCHENKOV, G.M.; KOLCHIN, A.M.; AKISHIN, P.A.

Mass spectrometric study of the thermionic emission of cesium with various emitters. Fiz. tver. tela 1 no.6:919-922 Je '59. (MIRA 12:10)

1.Moskovskiy gosudarstvennyy universitet im. M.V. Lomonosova.
(Thermoionic emission)

AUTHORS: Akishin, P.A., Rambidi, N.G. and Zasorin, Ye.Z. SOV/70-4-2-7/36

TITLE: The Electronographic Study of the Structures of Molecules of the Aluminium Halides (Elektronograficheskoye issledovaniye stroyeniya molekul galogenidov alyuminiya)

PERIODICAL: Kristallografiya, 1959, Vol 4, Nr 2, pp 186-193 (USSR)

ABSTRACT: Electron-deficient molecules such as the Al_2X_6 aluminium halides are of current interest. The existence of dimers has been confirmed by spectra of combination scattering in melts, vapour pressure, X-ray structure analysis, I.R. absorption, etc. Electronographic studies were made at a vapour pressure of about 10 mm Hg at 40, 60 and 80 kV. For each material 15-25 series of exposures were made. Precautions were taken against hydrolysis. After photometry, radial distribution curves were calculated from:

$$D(r) = \int_0^{s_{max}} sI(s) \cdot \exp(-as^2) \cdot \sin sr \cdot ds$$

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after Karle and Karle (Ref 14). The theoretical curves for refinement of parameters were calculated on the Strela machine from:

$$I(s) = \sum_{ij} Z_i Z_j \cdot \exp\left(\frac{l_{ij}^2}{2} s^2\right) \frac{\sin sr}{sr}$$

Numerical data on the scattering curves are given. The results found were: fluoride - plane AlF_3 triangle with Al - F = 1.63 ± 0.01 Å, F - F = 2.82 ± 0.02 Å, F - Al - F = 120°; chloride - bridge model of Al_2Cl_6 with symmetry V_h and Al - Cl = 2.04 ± 0.02 Å ($r_{1,3}$), Al - Cl = 2.24 ± 0.02 Å ($r_{1,8}$), α = 122° ± 3, β = 87 ± 3 : bromide - bridge model Al_2Br_6 with symmetry

The Electronographic Study of the Structures of Molecules of the Aluminium Halides

V_h and Al - Br = 2.22 ± 0.02 Å ($r_{1,3}$), Al - Br = = 2.38 ± 0.02 Å ($r_{1,8}$) $\alpha = 118^\circ \pm 3$, $\beta = 82^\circ \pm 5$; iodide - plane AlI_3 triangle, Al - I = 2.44 ± 0.02 Å, I - Al - I = 120° (assumed). The dimer was also present in the iodide vapour.

AlF_3 has not been hitherto examined. The results for the Al_2X_6 molecules agree best with Hamilton's calculations of the structure of diborane by the self-consistent molecular orbital method. He described the valency state by an sp^2 hydrid wave function giving a bond angle of 120°. The angle of ~90° is explained by supplementary hybridisation of sp^2 - and p-orbitals perpendicular to the plane of the sp^2 function. (in accordance with the work of Hamilton (Ref 21)). Acknowledgments are made to K.N. Semenenko and B.M. Shchedrin.

The Electronographic Study of the Structures of Molecules of the Aluminium Halides SOV/70-4-2-7/36

There are 4 figures, 3 tables and 21 references, 2 of which are Soviet, 3 German, 2 French and 14 English.

ASSOCIATION: Moskovskiy gosudarstvennyy universitet imeni M.V. Lomonosova (Moscow State University imeni M.V. Lomonosov)

SUBMITTED: July 15, 1958

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SOV/70-4-2-8/36

AUTHORS: Akishin, P.A., Naumov, V.A. and Tatevskiy, V.M.

TITLE: An Electronographic Investigation of the Structure of Molecules of the Halides of Gallium and Yttrium (Elektronograficheskoye issledovaniye stroyeniya molekul galogenidov galliya i ittriya)

PERIODICAL: Kristallografiya, 1959, Vol 4, Nr 2, pp 194-200 (USSR)

ABSTRACT: Investigations were made, as in the previous paper, using the sector-photometric method and the new electronograph at the MGU. The results were analysed by successive approximations and the method of radial distributions. Theoretical and experimental distribution curves are reproduced. Ga_2Cl_6 and Ga_2Br_6 were dimeric with Ga-Ga distances of 3.28 and 3.41 Å, respectively, and angles X_3-Ga_2-X_4 of $112^\circ \pm 3$ and $110^\circ \pm 3$ and Ga_1-X_5-Ga_2 of $91^\circ \pm 3$ and $93^\circ \pm 3$. All other distances are tabulated. The other compounds GaF_3, GaI_3, YF_3, YCl_3, YBr_3 and YI_3 were plane triangular molecules with Me-X

Card1/2

An Electronographic Investigation of the Structure of Molecules of the Halides of Gallium and Yttrium

distances of 1.88, 2.44, 2.04, 2.47, 2.63, 2.80 ± 0.03 Å, respectively. These observations contradict some by Brode (Ref 3). Ga_2F_6 molecules were present (as shown by mass spectrometry) to an extent of <1% and Ga_2I_6 molecules were present to about 8% in GaI_3 at the m.p. There are 5 figures, 3 tables and 13 references, 3 of which are Soviet, 10 English.

ASSOCIATION: Moskovskiy gosudarstvennyy universitet imeni M.V. Lomonosova (Moscow State University imeni M.V. Lomonosov)

SUBMITTED: July 15, 1958

SOV/70-4-3-11/32

AUTHORS: Akishin, P.A., Vilkov, L.V. and Rosolovskiy, V.Ya.

TITLE: Investigation of the Structures of Molecules of Perchloric Acid and Perchloric Anhydride

PERIODICAL: Kristallografiya, 1959, Vol 4, Nr 3, pp 353-359 (USSR)

ABSTRACT: $HClO_4$ was made by distilling $HClO_4 \cdot 2H_2O$ in vacuo with oleum. Cl_2O_7 was made by reacting $HClO_4$ with P_2O_5 and distilling at -54° and 2 mm Hg. Electronograms were taken as described earlier (A.V. Frost et al. - Ref 5) and interpreted in two ways: a) by transformation to radial density distributions and b) by trial and error involving comparison of observed and calculated scattering curves. Calculations were made on the Strela machine. For $HClO_4$ 28 electronograms were taken for $\lambda = 0.052 - 0.062$ Å. Intensity curves showed 10 peaks and led to final molecular dimensions of: (Cl = O) 1.42 ± 0.01 Å; (Cl - O) 1.64 ± 0.02 Å and (O-Cl-O) 100° ± 2°. H-positions were not found. There

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Investigation of the Structures of Molecules of Perchloric Acid and Perchloric Anhydride

are three Cl = O bonds and one Cl - O in the $HClO_4$ molecule which has the symmetry C_{3v}.

For Cl_2O_7 a series of 32 electronograms showed 8 peaks. The molecule $O_3Cl\text{-}O'\text{-}ClO_3$ was found to have the following dimensions: (Cl = O) (in the ClO_3 groups) + 424 ± 0.01 Å; (Cl - O') 1.725 ± 0.03 Å ; ∠(ClO'Cl) 115° ± 5°; ∠(O ClO') 97° ± 3°. The molecule appears to have only one plane of symmetry (containing the two Cl atoms and the middle O' atom) with the ClO_3 groups in opposite orientations. It is significant that these two molecules each have two different Cl-O bond distances whereas the ClO_4^- ion is tetrahedral. In $HClO_4$ and Cl_2O_7 the height of the ClO_3 pyramid (~0.2 Å) is near to the normal oscillation amplitude along the Cl-O bond and hence the

Investigation of the Structures of Molecules of Perchloric Acid and Perchloric Anhydride SOV/70-4-3-11/32

molecules can easily dissociate to form active complexes. Acknowledgments are made to V.I. Mikheyeva and A.A. Zinov'yev. There are 5 figures, 4 tables and 14 references, of which 6 are Soviet, 5 German, 1 English and 2 Scandinavian.

ASSOCIATIONS: Moskovskiy gosudarstvennyy universitet im. M.V. Lomonosova (Moscow State University imeni M.V.Lomonosov)
Institut obshchey i neorganicheskoy khimi (Institute of General and Inorganic Chemistry)

SUBMITTED: February 10, 1959

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SOV/70-4-3-12/32

AUTHORS: Akishin, P.A., Rambidi, N.G. and Zasorin, Ye.Z.

TITLE: An Electronographic Investigation of the Structure of Phosphorus Pentoxide

PERIODICAL: Kristallografiya, 1959, Vol 4, Nr 3, pp 360-364 (USSR)

ABSTRACT: The structure of the well-known P_4O_{10} molecule (with tetrahedral symmetry) has been refined giving P-O distances of 1.60 ± 0.01 Å (between P atoms) and 1.40 ± 0.03 Å (at corner P atoms) with POP angles of $124^\circ 30' \pm 1^\circ$. These compare with 1.62 ± 0.02, 1.39 ± 0.02 and $123^\circ 30' \pm 1^\circ$ found by Hampson and Stosick (Ref 3). Electronograms were made of the phosphorus pentoxide vapour with the Moscow University apparatus. Vapour was evaporated from a Mo ampule at a pressure (in the ampule) of 5-10 mm Hg. Electronograms were taken with the superposition of two-bladed s^2 and s^3 sectors to even out the backgrounds. The patterns were microphotometered and the intensity distributors were inverted to radial density distributions after Karle (Ref 10). Successive approximation methods of matching the scattering curve were

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An Electronographic Investigation of the Structure of Phosphorus Pentoxide SOV/70-4-3-12/32

also applied for the last refinements. The Strela machine of the university computing centre was used for all calculations. Wavelengths used were 0.0443 to 0.0605 Å. Hampson and Stosick's measurements were based on visual estimations of intensities and the present experimental data should be considerably better than theirs. A table of the final calculated and observed values of the positions of the intensity maxima and minima shows a very satisfactory agreement and gives a mean value for s(theoretical) / s (experimental) of 1.000 ± 0.007 for 17 points. There are 3 figures, 3 tables and 12 references, of which 2 are Soviet, 5 English, 1 Japanese, 1 international, 2 French and 1 German.

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SOV/70-4-3-12/32

An Electronographic Investigation of the Structure of Phosphorus Pentoxide

ASSOCIATION: Moskovskiy gosudarstvennyy universitet imeni M.V. Lomonosova (Moscow State University imeni M.V. Lomonosov)

SUBMITTED: July 19, 1958

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5(4)

AUTHORS: Akishin, P. A., Rambidi, N. G. SOV/78-4-4-3/44

TITLE: Electronographic Investigation of the Molecular Structures of Rubidium and Potassium Halides (Elektronograficheskoye issledovaniye stroyeniya molekul galogenidov rubidiya i kaliya)

PERIODICAL: Zhurnal neorganicheskoy khimii, 1959, Vol 4, Nr 4, pp 718-723 (USSR)

ABSTRACT: Electronographic investigations were carried out on the molecular structures of vaporized rubidium and potassium halides. The results are summarized in table 1. The effective interatomic distance $r(Me-X)_{effect.}$ was determined using the difference in the parameters Me-X between the dimer and monomer molecules as well as by using the vapor composition. The variation of the effective interatomic distance in the halides of the alkali metals was investigated in relation to the degree of dimerization of the vapor. It was found that in the presence of 50 % dimeric molecules the effective atomic distance agreed closely with the interatomic distance

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Me-X in the dimeric molecule. The calculated interatomic distance in the dimeric molecules Rb_2Cl_2, K_2Cl_2, and K_2J_2 are given in table 3. The values for r(Rb-Cl), r(K-Cl), and r(K-J) in the dimeric molecules agree well with the results of L. E. Maxwell (Ref 6). In table 2 the results of the electronographic investigations are compared with the results of other authors (Ref 6); in table 4 the vapor compositions (characterized by the degree of dimerization) are given for all compounds investigated. There are 2 figures, 4 tables, and 8 references, 3 of which are Soviet.

SUBMITTED: January 9, 1958

AKISHIN, P.A.; NAUMOV, V.A.; TATEVSKIY, V.M.

Electron diffraction investigation of the structure of molecules of vaporous gallium, yttrium, lanthanum, and neodymium halides. Vest.Mosk.un.Ser.mat., mekh., astron., fiz., khim. 14 no.1: 229-236 '59. (MIRA 13:8)

1. Kafedra fizicheskoy khimii Moskovskogo universiteta.
(Halides)

SOV/76-33-1-4/45

5(4)

AUTHORS: Akishin, P. A., Spiridonov, V. P., Khodchenkov, A. N.

TITLE: Electron Diffraction Investigation of the Molecular Structure (Elektronograficheskoye issledovaniye stroyeniya molekul) IX. Halides of Bivalent Mercury (IX. Galogenidy dvukhvalentnoy rtuti)

PERIODICAL: Zhurnal fizicheskoy khimii, 1959, Vol 33, Nr 1, pp 20-24 (USSR)

ABSTRACT: Since publications (Refs 1-3) give different values for the interatomic distances mercury-halogen, a new determination of the molecular parameters of HgX_2 is carried out by use of an improved apparatus and calculation method. The structures of the bivalent mercuric chloride, mercuric bromide, and mercuric iodide were determined. Determinations of HgF_2 were not successful. The electron diffractions were recorded by an electronograph of the Moscow State University. The calculations were carried out according to two methods, the method of gradual approach and of radial distribution. The curves of the radial distribution which were plotted according to Uolter and Bich's equation (Fig 1) indicated a linear configuration of the HgX_2

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Electron Diffraction Investigation of the Molecular Structure. IX. Halides of Bivalent Mercury

molecules. In order to compare the results which were obtained visually and photometrically, microphotometric investigations of the HgJ_2 molecules were carried out by means of a microphotometer MF-4. The investigations carried out by means of electron diffraction showed that the molecules $HgCl_2$, $HgBr_2$ and HgJ_2 have a linear structure; the geometric parameters are compared with reference data (Table 4). In the case of the distances Hg-Cl and Hg-Br the values obtained coincide with those obtained by radiospectrographic methods (Ref 13). There are 2 figures, 4 tables, and 13 references, 6 of which are Soviet.

ASSOCIATION: Moskovskiy gosudarstvennyy universitet im. M. V. Lomonosova (Moscow State University imeni M. V. Lomonosov)

SUBMITTED: May 17, 1957

5(4), 24(7)

AUTHORS: Akishin, P. A., Vilkov, L. V., Vesnin, Yu. I. SOV/20-126-2-23/64

TITLE: The Electromagnetic Investigation of the Structure of the Molecules of Vinyl Chloride and Trifluorochlorethylene (Elektronograficheskoye issledovaniye stroyeniya molekul khloristogo vinila i triftorkhloretilena)

PERIODICAL: Doklady Akademii nauk SSSR, 1959, Vol 126, Nr 2 pp 310-313 (USSR)

ABSTRACT: Knowledge of the molecular structure of vinyl chloride C_2H_3Cl and trifluorochlorethylene C_2F_3Cl is of essential interest for understanding the mechanism of their polarization and also for the purpose of explaining some problems of molecular structure. This includes especially the conception of double bond. All unsettled questions concerning the structure of the molecule C_2H_3Cl arise apparently also in the case of the molecule of C_2F_3Cl. The electronograms of the vapors of C_2H_3Cl and C_2F_3Cl were taken by means of an earlier described (Ref 5) electronograph. These electronograms were then evaluated by visual evaluation of intensity according to the method of radial distribution (curves rD(r)) and

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successive approximations (curves I(s)). For vinyl chloride vapors (boiling point -13.8°) a total of 7 series of electronograms was recorded. From the data given in a table the experimental curve was then derived, and from it the radial distribution curve was calculated. The main peaks of this curve corresponds to the following interatomic distances: 1) 1.32 Å r(C = C); 2) 1.72 Å r(C - Cl), and 3) 2.71 Å r(C...Cl). By the method of successive approximations the distance r(C = C) was essentially precisely defined. The following parameters were determined for the molecule of vinyl chloride: r(C - C) = 1.32 ± 0.02 Å; r(C - Cl)=1.72±0.01 Å; LCCCl = 125±2°; r(C - H) = 1.07 Å, and for LHCH = LHCCl 120° is assumed. A total of 9 series of electronograms was recorded of the vapors of C_2F_3Cl. On the basis of experimental data the experimental intensity curve was then constructed. The inner part of the diffraction picture was so diffuse that the 3 visually found maxima could not be measured. The curve of radial distribution was derived from the experimental intensity curve. The peaks of the curve r D(r) belong to the following interatomic distances in the molecule $F_2C-CFCl$=1.32 Å-rC-F and r(C = C), 172 Å-r(C - Cl); 2.32 Å-r(C..F),

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The Electromagnetic Investigation of the Structure of the Molecules of Vinyl Chloride and Trifluorochlorethylene SOV/20-126-2-23/64

r = (F..F'); 2.67 Å - r(Cl..F); r(C...Cl), r(F'..F"); 3.07 Å - r(Cl..F)); 3.57 Å - r(C..F"); 3.93 Å - r(Cl..F'). In the halogen derivatives of ethylene the length of the C-C - bond does not increase but rather decreases. No systematic variations of the length of the C-Cl-bond (as a function of the number of halogen atoms) were observed. There are 4 figures, 4 tables, and 9 references, 4 of which are Soviet.

ASSOCIATION: Moskovskiy gosudarstvennyy universitet im. M. V. Lomonosova (Moscow State University imeni M. V. Lomonosov)

PRESENTED: February 5, 1959 by V. N. Kondrat'yev, Academician

SUBMITTED: February 2, 1959

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5.2400(A)

67921

SOV/20-129-5-31/64

AUTHORS: Akishin, P. A., Nikitin, O. T., Gorokhov, L. N.

TITLE: Determination of the Heat of Sublimation of Boron by the Masspectroscopic Method

PERIODICAL: Doklady Akademii nauk SSSR, 1959, Vol 129, Nr 5, pp 1075-1078 (USSR)

ABSTRACT: The authors point to the literature data (Refs 1-5) on the sublimation heat of elementary boron which widely diverge. The value given by A. W. Searsy and C. E. Mayers (Ref 5) seems the most probable one, however, it needs further examination. The latter was made by the authors with the evaporation from an effusion chamber being combined with mass spectroscopic determination of the composition and with the determination of vapor pressure. The amorphous boron put at the disposal by A. F. Zhigach was transformed into crystalline boron by annealing in the vacuum at 2000-2100°K. The effusion chamber produced from tantalum or molybdenum was lined with pressed crystalline boron. The effusion chamber (Fig 1) was fitted into the vaporizer of an ion source of a mass spectrometer of type MS-3. Heating was made by electron bombardment, the chamber tempera-

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Determination of the Heat of Sublimation of Boron by the Masspectroscopic Method

ture was determined by a pyrometer of type OPPIR-09 calibrated according to the pyrometer of type OP-48, on the basis of the luminescence of a blind channel drilled into the bottom of the chamber which emitted the radiation of an absolutely black body with sufficient accuracy. The apparatus will be described in the periodical "Pribory i tekhnika eksperimenta". The mass spectra of vaporous boron contained only the ions $(B^{10})^+$ and $(B^{11})^+$. B_2^+-ions were not observed. The absolute vapor pressure was measured according to the method by M. G. Inghram et al. (Refs 10,11). First, Ag was evaporated from the effusion chamber, then the sensitivity to boron was calculated on the basis of the sensitivity of the apparatus to Ag observed. The heat of sublimation ΔH_o^o of boron was determined by the equation $\Delta H_o^o = (\Delta \Phi^* - R \ln p_B)$. $\Delta \Phi^* = \Phi^*_{gas} - \Phi^*_{solid}$ denotes the change of the reduced thermodynamic potential. The values Φ^*_{gas} and Φ^*_{solid} were put at the disposal by L. V. Gurvich. p_B denotes

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Determination of the Heat of Sublimation of Boron by the Masspectroscopic Method

the boron vapor pressure. Table 1 gives the results of an experiment, table 2 shows the total results from 7 experiments. Figure 2 shows the dependence of ΔH_o^o on the logarithm of the parameter $\frac{S}{aK}$ of the chamber (a = area of the effusion opening, K = Klausing coefficient, S = evaporation surface). On the basis of the equation (3) mentioned in reference 14 the evaporation coefficient was calculated to be 0.2 - 0.3 in the temperature range 1600 - 2000°K. The value 131.6 ± 5 kcal/gram-atom is given as mean value for ΔH_o^o from 7 experiments by taking into account the maximum possible experimental error. There are 2 figures, 2 tables, and 14 references, 2 of which are Soviet.

ASSOCIATION: Moskovskiy gosudarstvennyy universitet im. M. V. Lomonosova (Moscow State University imeni M. V. Lomonosov)

PRESENTED: July 16, 1959, by V. N. Kondrat'yev, Academician)

SUBMITTED: July 15, 1959

5.2400(A)

SOV/20-129-6-33/69

5(4)

AUTHORS: Akishin, P. A., Spiridonov, V. P.

TITLE: The Electron Diffraction Investigation of the Structure of the Molecule of Boron Sulphide

PERIODICAL: Doklady Akademii nauk SSSR, 1959, Vol 129, Nr 6, pp 1317-1320 (USSR)

ABSTRACT: The authors give a short description of the production and degasification of the pure boron sulphide used. The vapor electron diffraction patterns of B_2S_3 were recorded at 800-900°C with and without a rotating sector and with exposures of between 10 sec and 2 min. Electron wave length was 0.0402-0.0573 Å. The diapositive plates used were covered with india ink in order to protect the evaporator from light radiation, which was washed off before the plates were developed. 10 electron diffraction patterns were produced, which were deciphered by the method of the radial distribution in the variation according to J. and I. Karle (Refs 3-5) and by the method of successive approximations. The curve D(r) of radial distribution drawn on the basis of experimental data is shown in figure 1. As structurally chemical possible configurations of the B_2S_3-molecule the authors investigated the bipyramide with three S-atoms in an

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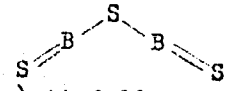
The Electron Diffraction Investigation of the Structure of the Molecule of Boron Sulphide

equilateral plane triangle. Both B-atoms are located at equal distances on both sides of the plane of the triangle. Besides, the plane angular configuration



was investigated. From the curve D(r) it follows that the bipyramide is not possible, whereas the plane angular configuration corresponds to measured results. Also by means of successive approximation (Fig 2, Table 1) the plane angular configuration is found, among all models, to correspond best to the experimental data if considerable deformation vibrations of the valence angle on the central sulfur atom are assumed. The following values are calculated for this configuration:

$r(B - S) = 1.81 \pm 0.02$ Å; $r(B = S) = 1.65 \pm 0.03$ Å,
$< B - S - B = 96 \pm 5^{\circ}$. The authors found the value for $r(B = S)$ to be in good agreement with the distance in the molecule of BS (1.62 Å). There are 2 figures, 1 table, and 8 references, 3 of which are Soviet.

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SOV/20-129-6-33/69

The Electron Diffraction Investigation of the Structure of the Molecule of Boron Sulphide

ASSOCIATION: Moskovskiy gosudarstvennyy universitet im. M. V. Lomonosova (Moscow State University imeni M. V. Lomonosov)

PRESENTED: July 16, 1959, by V. N. Kondrat'yev, Academician

SUBMITTED: July 15, 1959

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AKISHIN, P. A.

PHASE I BOOK EXPLOITATION SOV/4941

Mezhvuzovskoye soveshchaniye po khimii nefti, Moscow, 1956.

Sbornik trudov Mezhvuzovskogo soveshchaniya po khimii nefti (Collection of Transactions of the Inter-University Conference on Petroleum Chemistry) [Moscow] Izd-vo Mosk. univ., 1960. 313 p. Errata slip inserted. 1,600 copies printed.

Organizing Committee of the Conference: Chairman: B. A. Kazanskiy, Academician; Vice-Chairman: S. I. Khromov, Docent; G. N. Panchenkov, Professor; A. F. Plate, Professor; Secretary: Ye. S. Balenkova, Scientific Worker. Editorial Board: Resp. Ed.: A. F. Plate; I. V. Gostunskaya, I. N. Tits-Skvortsova, L. A. Erivanskaya.

PURPOSE: This collection of articles is intended for the teaching staff of universities and schools of higher education training specialists for the petroleum and petroleum-refining industries.

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COVERAGE: The collection includes articles dealing with the present state of the petroleum industry, the scientific research problems in petroleum chemistry, the chemistry of petroleum, the composition of petroleum and petroleum products, the scientific principles of refining petroleum into motor fuels and lubricants, and the manufacture of synthetic products from hydrocarbon gases and petroleum. One article discusses the effect of chemical composition and additives on fuel combustion in jet engines. The material was presented at the Inter-University Conference on Petroleum Chemistry, held at the Moscow State University imeni M. V. Lomonosov November 26-29, 1956. No personalities are mentioned. References accompany most of the articles.

TABLE OF CONTENTS: None given

The authors and the titles of articles are as follows:

Introduction by B. A. Kazanskiy, Academician

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Card 5/7

AKISHIN, P. A., Cand Chem Sci -- (diss) "Research into intensities of bands of characteristic vibrations in combination spectra scattering /Raman scattering/ of organic compounds and the utilization of the spectra for analysis of products of organic reactions." Moscow, 1960. 17 pp; (Moscow Order of Lenin and Order of Labor Red Banner State Univ im M. V. Lomonosov, Chemistry Faculty); 110 copies; price not given; list of author's work on pp 16-17 (27 entries); (KL, 27-60, 148)

AKISHIN, P.A.; GOROKHOV, L.N.

Kinetic energies of split[illegible] ions and [illegible] on the bond in molecular ions of cesium halides. Vest. Mosk. un. Ser. 2:3-6 M-D '59.
(MIRA 14:2)

1. Kafedra fizicheskoy khimii Moskovskogo universiteta.
(Cesium halides) (Ions)

5.4130

68103
SOV/78-5-1-5/45

~~5 (2), 5 (4)~~

AUTHORS: Akishin, P. A., Rambidi, N. G.

TITLE: Electron Diffraction Studies of the Molecular Structure of Sodium- and Lithium Halides

PERIODICAL: Zhurnal neorganicheskoy khimii, 1960, Vol 5, Nr 1, pp 23 - 30 (USSR)

ABSTRACT: The substances under investigation (LiF, LiCl, LiBr, LiJ, NaF, NaCl, NaBr, and NaJ) were evaporated out of molybdenum- or graphite effusion chambers at temperatures corresponding to a vapor pressure of about 5-10 torr. 6-7 series of electron-diffraction patterns were recorded at various acceleration potentials (40, 60, 80 kv) using the s^2 and s^3 sectors. The patterns were deciphered by the method of successive approximations and the method of radial distribution (Table 1). They showed (except for LiBr and LiJ) the intensity distribution of the electron scattering in the form of a decaying [illegible]usoid (Fig 3). The values of the interatomic distances r(Me-X) (Me = alkali metal, X = halogen) are shown in table 2. The content of dimeric molecules of sodium halides was estimated (Table 3). Since the

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Electron Diffraction Studies of the Molecular Structure of Sodium- and Lithium Halides

vapors of sodium- and lithium halides have a high content of dimeric molecules the dispersibility of which is four times higher than that of monomeric molecules, conclusions as to the structure of the dimers Me_2X_2 may be drawn from the diffraction (Fig 1). The authors report on the determination of the distances r(Me-X), r(Me-Me), and r(X-X), and show the results in table 3. The curves of radial distribution show one single peak only. On account of the comparison of the experimental curves with the theoretical curves for Li_2F_2 (Figs 3,4), the assumption of approximately equal vibrational amplitudes ℓ_{XX} and ℓ_{MeX} was proved to be contradictory to the experimental results, and a considerable difference between these amplitudes was found. Figures 5,6 and table 4 show the results for Li_2Br_2 and Li_2J_2. A plane quadrangle with alternating ions Me^+ and X^- at the corners seems to be the model of the Me_2X_2 molecule. The final decision as to whether the structure of Me_2X_2 corresponds to

Electron Diffraction Studies of the Molecular Structure of Sodium- and Lithium Halides

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SOV/73-5-1-5/45

this plane model or to a tetrahedron seems to depend on the investigation of the rotation vibration spectra. There are 6 figures, 4 tables, and 16 references, 7 of which are Soviet.

ASSOCIATION: Moskovskiy gosudarstvennyy universitet im. M. V. Lomonosova (Moscow State University imeni M. V. Lomonosov)

SUBMITTED: September 6, 1958

Card 3/3

AKISHIN, P.A.; GOROKHOV, L.N.; SIDOROV, L.N.

Mass-spectrometric study of cesium halides. Dokl. AN SSSR 135 no.1:113-116 N'60. (MIRA 13:11)

1. Moskovskiy gosudarstvenny universitet im. M.V.Lomonosova. Predstavleno akademikom V.N.Kondrat'yevym.
(Cesium halides)

AKISHIN, P.A.; VILKOV, L.V.; ROSOLOVSKIY, V.Ya.

Electron diffraction study of the structure of vapor molecules of nitric acid and nitric anhydride. Zhur. strukt. khim. 1 no.1:5-11 Je '60. (MIRA 13:8)

1. Moskovskiy gosudarstvennyy universitet imeni m.V.Lomonosova i Institut obshchey i neorganicheskoy khimii imeni N.S. Kurnakova AN SSSR.
(Nitric acid) (Nitrogen oxide)

S/189/60/000/003/001/003
B004/B056 82403

9.3100
24.2500

AUTHORS: Rambidi, N. G., Akishin, P. A.

TITLE: Extrapolation of the Experimental Intensity Distribution of the Scattering of Electrons From Molecules When Using the Method of Radial Distribution

PERIODICAL: Vestnik Moskovskogo universiteta. Seriya 2, khimiya, 1960, No. 3, pp. 18 - 21

TEXT: As the experimental distribution of the intensity of electron scattering is always obtained in restricted regions of scattering angles, the radial distribution curve constructed on the basis of these data always shows distortions which are caused by discontinuities. Therefore, radial distribution curves are calculated by means of extrapolation of the experimental intensity distribution on the basis of a theoretical curve $M_{th}(s)$ which corresponds to the molecular model. In the present paper, the authors investigated the influence exerted by this extrapolation upon the radial distribution curve in order to form an idea of the

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Extrapolation of the Experimental Intensity Distribution of the Scattering of Electrons From Molecules When Using the Method of Radial Distribution

range of application of this method. They proceed from function (1):

$D(r) = \int_0^\infty sM_{exp}(s)\sin sr.ds$, where $s = (4\pi/\lambda)\sin(\vartheta/2)$, ϑ = scattering angle, λ = length of electron waves, and $M_{exp}(s)$ = the experimentally obtained molecular component of scattering intensity. The experimental distribution is assumed to have been determined up to a value of $s = s_{max}$ and to be extrapolated by means of the theoretical curve $M_{th}(s)$ within the interval of $s_{max} - \infty$. By using equation (3) for $M_{th}(s)$, equation (5) is derived for the contribution $\eta(s_{max})$ of the experimental intensity distribution to the peak of the curve of radial distribution. Several values calculated in this way are given in Table 1. The same method is employed with the function (7) of radial distribution:

$f(r) = \int_0^{s_{max}} sM_{exp}(s)\exp(-as^2)\sin sr.ds$ (a = temperature factor), and for

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$\eta(s_{min})$ equation (8) is obtained, for which the data are given in Table 2. The data of Tables 1 and 2 prove that the contribution to the function of radial distribution, which is due to extrapolation of the experimental intensity distribution, may attain considerable values. In the case of weak peaks of the radial distribution curve, whose values differ only little from the diffraction effects, this contribution must be taken into account. There are 2 tables and 3 non-Soviet references.

ASSOCIATION: Kafedra fizicheskoy khimii (Chair of Physical Chemistry)

SUBMITTED: March 26, 1960

AKISHIN, P.A.; RAMBIDI, N.G.; YEZHOV, Yu.S.

Electron diffraction study of the structure of the P_4S_3 molecule. Zhur. neorg. khim. 5 no.3:747-749 Mr '60. (MIRA 14:6)

1. Moskovskiy gosudarstvennyy universitet im. M. V. Lomonosova.
(Phosphorus sulfide)

8772

S/120/60/000/004/011/028
E032/E414

5.5800 (1043, 1228, 1273)

AUTHORS: Akishin, P.A., Gorokhov, L.N., Nikitin, O.T. and Khodeyev, Yu.S.

TITLE: Application of a Mass-Produced Mass-Spectrometer to the Study of Evaporation of High Melting Point Materials

PERIODICAL: Pribory i tekhnika eksperimenta, 1960, No.4, pp.98-102

TEXT: One of the most effective methods of determination of the composition of vapours and their thermodynamic characteristics (pressure, heats of sublimation and dissociation) is the combination of the Knudsen effusion method and the mass-spectrometric analysis of the effusing vapour. The mass produced mass-spectrometers MC-3 (MS-3), MC-4 (MS-4) and MM-1305 (MI-1305) were designed for the isotopic analysis but with certain modifications and improvements they can also be used to study the properties of vapours of high melting point materials. These modifications include the provision of an ion source incorporating the effusion chamber whose temperature can be varied during the experiment, the provision of a device which prevents the molecular beam from reaching the ionization chamber so that the intensity of a mass-line under investigation can be compared with the background

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Application of a Mass-Produced Mass-Spectrometer to the Study of Evaporation of High Melting Point Materials

intensity, and the inclusion of a high-sensitivity ion current detector for use with substances whose vapour pressure under the experimental conditions which can be achieved with these spectrometers is relatively low. The present paper gives an account of these modifications as introduced in the MS-3 mass-spectrometer. The effusion chamber employed is shown in Fig.2, in which 1 is the effusion chamber, 2 is a heating spiral, 3 is a tantalum screen, 4 is a stainless steel screen, 5 is the body and 7 is a thermocouple. The dimensions of the effusion chamber are: internal diameter 5 mm, length 5.5 mm, diameter of effusion aperture 0.1 mm (or greater). The distance from the effusion aperture to the centre of the ionization region is about 10 mm. No details are given of the ionization device except for a statement that the ion source is a modified form of the normal ion source used in the MS-3 mass-spectrometer. In the case of temperatures between 1000 and 2000°C, the effusion chamber illustrated in Fig.3 was employed. The actual effusion

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chamber 4 is surrounded by a series of tantalum radiation shields 2 and the substance under investigation 6 is fitted into the effusion chamber as shown. The dimensions of the effusion chamber are as follows: internal diameter 3 mm, external diameter 5 mm, length of cavity 6 mm, effusion aperture diameter 0.05 mm (or greater). The temperature is measured pyrometrically to an accuracy of $\pm$ 5° in the range 900 to 1400°C, and $\pm$ 10° in the range 1400 to 2000°C. The low ion currents in the spectrometer are measured by the method described by Shutze and Bernhard (Ref.7) and Kuznetsov (Ref.8). Ions entering the entrance slit of the detector are accelerated through a negative potential of 5 to 10 kV and eject secondary electrons from a metal target. Secondary electrons with energies between 5 and 10 keV give rise to scintillations in a phosphor which are recorded by a photomultiplier. The sensitivity threshold of the instrument is 2×10^{-17} amp. The apparatus has been used in preliminary experiments to determine the heat of sublimation of silver. This quantity was found to be

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E032/E414

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65.0 ± 0.9 kcal/g.at in the temperature interval 1115 to 1233°K. The first effusion chamber has been used to study the vapour composition and sublimation heats of sodium chloride (Ref.4), lithium chloride and other inorganic compounds (Ref.10). The high-temperature effusion chamber has been used to measure the heats of sublimation of high melting point materials, as described by the present authors in Ref.10 and 11. There are 5 figures and 11 references: 8 Soviet and 3 non-Soviet.

ASSOCIATION: Khimicheskiy fakul'tet MGU
(Division of Chemistry, Moscow Stat. University)

SUBMITTED: June 15, 1959

Card 4/5

AKISHIN, P.A.; VILKOV, L.V.; SOKOLOVA, N.P.

Electronographic analysis of the structure of molecules of monochloro and monobromodimethyl ethers. Izv.Sib.otd.AN SSSR no.5:59-65 '60. (MIRA 13:7)

1. Moskovskiy gosudarstvennyy universitet im. M.V.Lomonosova i Institut neorganicheskoy khimii Sibirskogo otdeleniya AN SSSR.
(Methyl ether) (Electron diffraction examination)

AKISHIN, P.A.; NAUMOV, V.A.

Electron diffraction study of the structure of the ScF_3 molecule in vapors and evaluation of the scandium - halogen interatomic distances in $ScCl_3$, and ScI_3 molecules. Zhur. strukt. khim. 2 no. 1:3-6 Ja-F '61. (MIRA 14:2)

1. Moskovskiy gosudarstvennyy universitet im. M.V. Lomonosova.
(Scandium halides)

ALESHIN, P.A.; SPIRIDONOV, V.P.

Structure of gaseous lithium metaborate and sodium metaborate molecules. Zhur. strukt. khim. 2 no. 1:63 Ja-F '61.
(MIRA 14:2)

1. Moskovskiy gosudarstvennyy universitet im. M.V. Lomonosova.
(Lithium borate) (Sodium borate)

AKISHIN, P.A.; KHODEYEV, Yu.S.

Mass spectrometric method of determining the heats of sublimation of uranium tetrafluoride. Zhur. fiz. khim. 35 no.5:1169-1170 My '61. (MIRA 16:7)

1. Moskovskiy gosudarstvennyy universitet imeni Lomonosova.
(Uranium fluoride—Spectra)
(Heat of sublimation)

RAMBIDI, N.G.; AKISHIN, P.A.; ZASORIN, Ye.Z.

Electron diffraction study of the structure of uranium tetrabromide molecule in the vapor phase. Zhur. fiz. khim. 35 no.5: 1171 My '61. (MIRA 16:7)

1. Moskovskiy gosudarstvennyy universitet imeni Lomonosova.
(Uranium bromide)
(Electron diffraction examination)

20961

S/192/61/002/002/001/002
B130/B205

15.2210 1273, 1142, 1043

AUTHORS: Akishin, P. A., Gorokhov, L. N., and Khodeyev, Yu. S.

TITLE: Composition of lithium and sodium metaborate vapors

PERIODICAL: Zhurnal strukturnoy khimii, v. 2, no. 2, 1961, 209-210

TEXT: The composition of lithium and sodium metaborate vapors was determined by mass-spectrometric studies. This method has been used by the authors for an electron-diffraction study of the structure of metaborates (P. A. Akishin, V. P. Spiridonov, Zh. strukt. khimii, 2, 1, 63 (1960)). In preliminary experiments, Na and Li metaborates were evaporated on a platinum strip which replaced the cathode of the ion source used for the isotope analysis of gases. The mass spectra displayed ions of Me^+, B^+, BO^+, BO_2^+, $MeBO_2^+$, and $Me_2BO_2^+$. As the spectra of Na and Li metaborates are similar, further investigations were performed only with Li metaborate. As compared to the intensity of the ion $LiBO_2^+$, the relative intensity of the ion $Li_2BO_2^+$ increases with a rise in temperature (the

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Composition of lithium and ...

ratio $I_{Li_2BO_2^+}/I_{LiBO_2^+}$ changes from 0.33 at 700°C to 0.56 at 850°C). The presence of $Li_2BO_2^+$ in the mass spectrum is indicative of the existence of more complex molecules than $LiBO_2$ in metaborate vapor. The congruence of the curves (Fig.) obtained by tests with deflecting condenser and an effusion chamber (nickel chamber) containing both the substance to be tested and an admixture of silver, has shown that $Li_2BO_2^+$ originates from a molecule $LiBO_2$ and is no fragment ion. The broadening of the curve of $Li_2BO_2^+$ ions, however, indicates an additional amount of kinetic energy, which is a characteristic feature of fragment ions. It was concluded that saturated vapor of Li and Na metaborates has a complex composition. One component is the molecule of type $MeBO_2$; the other component has not yet been exactly defined and requires further investigations. The mass spectrum of superheated Li metaborate vapor shows that in this case the chiefe component of the vapor is $LiBO_2$. There are 1 figure, 1 table, and 8 references: 5 Soviet-bloc and 3 non-Soviet-bloc.

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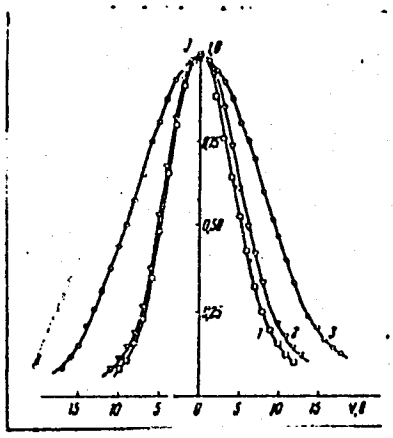
Composition of lithium and ...

ASSOCIATION: Moskovskiy gosudarstvennyy universitet im. M. V. Lomonosova (Moscow State University imeni M. V. Lomonosov)

SUBMITTED: April 17, 1960

Figure: Relative intensity as a function of deflecting potential. Legend: 1) Ag^+; 2) $LiBO_2^+$; 3) $Li_2BO_2^+$.



Card 3/3

RAMBIDI, N.G.; AKISHIN, P.A.

High precision analysis of electron-diffraction data on the structural parameters of molecules in the gaseous phase. Zhur.strukt.-khim. 2 no.3:251-259 My-Je '61. (MIRA 15:1)

1. Moskovskiy gosudarstvennyy universitet imeni Lomonosova.
(Molecules) (Electron diffraction examination)

S/192/61/002/004/003/004
D217/D306

5.4130

AUTHORS: Akishin, P.A., Rambidi, N.G. and Bredikhina, T.N.

TITLE: Electronographic investigation of the structure of ferrocene molecules

PERIODICAL: Zhurnal strukturnoy khimii, v. 2, no. 4, 1961, 476

TEXT: At the Laboratory for the Electronographic Investigation of Molecules of the Chemical Faculty of the MGU, a systematic investigation into the structure of the molecules of electron-saturated compounds is being carried out. In this short report, the preliminary results of the study of the geometry of ferrocene molecules in vapors are given. The sandwich structure of ferrocene molecules has been reliably proved to exist both by X-ray crystal study and by an electronographic investigation of ferrocene in vapors. The aim of this investigation was to obtain more accurate data on the geometrical parameters of the

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S/192/61/002/004/003/004
D217/D306

Electronographic investigation...

ferrocene molecule and on the nature of the relative movement of the cyclo-pentadiene groups. Nine series of electronographs (2 plates in each series) were produced and treated. A more accurate method was used for interpreting the experimentally obtained sector-micro-photometric distribution of the dispersion intensity. The following parameters were found for ferrocene molecules: r (C - H) = 1.12 ± 0.02 Å; r (C - C) = 1.42 ± 0.01 Å; r (Fe - C) = 2.07 ± 0.01 Å. The analysis of the experimentally obtained data confirms the free revolution of the cyclo-pentadiene groups around an axis perpendicular to the plane of the rings. A detailed explanation of the results of the investigation and of the refined method of interpretation of the electronographs will be published shortly. There are 5 references: 1 Soviet-bloc and 4 non-Soviet-bloc. The references to the English-language publication read as follows: F. Eiland, R. Pepinsky, J. Amer. Chem. Soc., 74, 4971 (1952). J.D. Dunitz, L.E. Orgel, A. Rich, Acta Crystallogr. 9, 373 (1965). E.A.

Card 2/3

24940

S/192/61/002/004/003/004
D217/D306

Electronographic investigation...

Seibold, L.E. Sutton, J. Chem. Phys., 23. 1967 (1955).

ASSOCIATION: Moskovskiy gosudarstvennyy universitet im M.V. Lomonosova (Moscow State University imeni M.V. Lomonosov)

SUBMITTED: December 14, 1960

X

Card 3/3

AKISHIN, P.A.; SPIRIDONOV, V.P.

Electron diffraction examination of the structure of an antimony (III) oxide molecule. Zhur.strukt.khim. 2 no.5: 542-544 S-O '61. (MIRA 14:11)

1. Moskovskiy gosudarstvennyy universitet imeni M.V. Lomonosova.
(Antimony oxide) (Chemical structure)

AKISHIN, P.A.; VILKOV, L.V.; MOCHALOVA, N.I.

Electron diffraction examination of the structure of molecules with conjugated multiple bonds. Part 1: α-chloroacrolein and methylglyoxal. Zhur.strukt.khim. 2 no.5:545-550 S-O '61. (MIRA 14:11)

1. Moskovskiy gosudarstvennyy universitet imeni M.V. Lomonosova.
(Acrolein) (Glyoxal)

TATEVSKIY, V.M.; SPIRIDONOV, V.P.; AKISHIN, P.A.

Law governing the interatomic distances of molecules of halides of various groups of the periodic table. Dokl.AN SSSR 138 no.3:621-624 My '61. (MIRA 14:5)

1. Moskovskiy gosudarstvennyy universitet im. M.V.Lomonosova. Predstavleno akademikom A.N. Frumkinym.
(Halides) (Molecules)

35996
S/189/62/000/002/002/004
D228/D302

5.2200

AUTHORS: Akishin, P.A., Spiridov, V.P., and Mishulina, R.A.

TITLE: Electronographic investigation of the evaporation products of selenium tetrachloride and tetrabromide

PERIODICAL: Moscow. Universitet. Vestnik. Seriya II, khimiya, no. 2, 1962, 23 - 25

TEXT: Previous work on the structure of selenium tetrahalides is considered to show the expediency of carrying out repeated electronographic investigations of $SeCl_4$ and $SeBr_4$ vapor by a more thorough method of examining and deciphering the electronograms. In this study the authors volatilized $SeCl_4$ and $SeBr_4$ at temperatures of 270 - 320°C and 170 - 210°C resp. after which the electronograms of the vapors were measured photometrically. Theoretical intensity curves were also constructed for a large number of structural models. It is suggested that the electronograms of $SeCl_4$ vapors apply to a

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Electronographic investigation ...

molecule with a true tetragonal configuration -- as has, in fact, already been pointed out by M. Lister et al. The average internuclear distances found for molecules in the vapors are: Se-Cl, 2·18 ± 0.02 Å; Se-Br, 2·32 ± 0.02 Å. There are 1 table and 8 references: 1 Soviet-bloc and 7 non-Soviet-bloc. The references to the English-language publications read as follows: D. Stevenson et al, J. Amer. Chem. Soc., 62, 1267, 1940; M. Lister et al, Trans. Faraday Soc., 37, 393, 1941; H. Bowen, Nature 172, 171, 1953; R. Livingston, Ann. Rev. Phys. Chem., 6, 395, 1955.

ASSOCIATION: Kafedra fizicheskoy khimii (Department of Physical Chemistry)

SUBMITTED: December 30, 1960

Card 2/2

VILKOV, L.V.; AKISHIN, P.A.; PRESNYAKOVA, V.M.

Electron diffraction study of the structure of molecules of trivalent nitrogen compounds: dimethylformamide and N-methylpyrrole. Zhur.strukt.khim. 3 no.1:5-9 Ja-F '62. (MIRA 15:3)

1. Moskovskiy gosudarstvennyy universitet imeni M.V.Lomonosova.
(Nitrogen compounds) (Electron diffraction examination)

S/192/62/003/003/002/006
D228/D307

AUTHORS: Spiridonov, V. P., Akishin, P. A. and Tsirel'nikov, V. I.

TITLE: Electronographic investigation of the structure of zirconium and hafnium tetrachloride molecules in the gaseous phase

PERIODICAL: Zhurnal strukturnoy khimii, v. 3, no. 3, 1962, 329-330

TEXT: The molecular structure of $ZrCl_4$ and $HfCl_4$ in the gaseous phase was investigated electronographically. This question is important in view of the need for information about the thermodynamic properties of these chlorides. The electronograms were obtained at 200 - 300°C and processed photometrically at the Computer Center of the MGU (Moscow State University). Experimental and theoretical data both suggest that the molecules possess the structure of the true tetrahedron. The values found for the internuclear Me-Cl distances agree well with those of previous workers. The closeness

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of these distances for $ZrCl_4$ and $HfCl_4$ is in accordance with the phenomenon of "Lanthanide compression". There are 2 figures and 1 table.

ASSOCIATION: Moskovskiy gosudarstvenyy universitet im. M. V. Lomonosova (Moscow State University im. M. V. Lomonosov)

SUBMITTED: January 8, 1962

35492
S/078/62/007/004/015/016
B107/B110

21.2000
15.2240

AUTHORS: Akishin, P. A., Khodeyev, Yu. S.

TITLE: Mass-spectrometric study of vapor composition above zirconium, titanium, and boron nitrides

PERIODICAL: Zhurnal neorganicheskoy khimii, v. 7, no. 4, 1962, 941 - 942

TEXT: It was studied whether undissociated molecules were present in the vapor above zirconium or titanium nitride. The subject of this study was also to confirm results obtained by Margrave (see below). An MC-3 (MS-3) mass-spectrometer was used for measuring. A detailed description has been published before (P. A. Akishin, L. N. Gorokhov, O. T. Nikitin, Yu. S. Khodeyev. Pribory i tekhnika eksperimenta, 4, 98 (1960)). At more than 2000°C, ZrO^+ and Zr^+ were observed in zirconium nitride. Their ratio of 2:1 did not change with temperature. They probably resulted from impurities. Above 1800°C, the ion currents of N_2^+ and N^+ increase, and at the same time the vacuum deteriorates. Hence, ZrN starts to decompose above 1800°C. At 1690°C and at an ionization potential of 45 v, titanium nitride showed the following mass spectrum:

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...Smagina, V. S. Kutsev,

B. F. Ormont are mentioned. There are 1 table and 7 references: 3 Soviet and 4 non-Soviet. The four references to English-language publications read as follows: Ref. 1: M. Hoch, D. P. Dingledy, H. L. Johnston. J. Amer. Chem. Soc., 77, 304 (1955); Ref. 4: P. O. Schissel, W. S. Williams. Bull. Amer. Phys. Soc., 4, 139 (1959); Ref. 5: J.Margrave, J. Phys. Chem., 59, 1231 (1955); Ref. 7: Proceedings of an International Symposium on High Temperature Technology. M. G. Inghram, J. Drowart. Mass Spectrometry Applied to High Temperature Chemistry. McGraw-Hill Book, 1960.

ASSOCIATION: Moskovskiy gosudarstvennyy universitet im. M. V. Lomonosova (Moscow State University imeni M. V. Lomonosov)

SUBMITTED: September 27, 1961

SOBOLEV, G.A.; SHCHERBAKOV, A.M.; AKISHIN, P.A.

Rotational spectrum and dipole moment of the vinylacetylene molecule. Opt. i spektr. 12 no.1:147 Ja '62. (MIRA 15:2)
(Butenyne--Dipole moments)
(Butenyne--Spectra)

AKISHIN, P.A.; SPIRIDONOV, V.P.; MISHULINA, R.A.

Electron diffraction examination of the evaporation products of selenium tetrachloride and tetrabromide. Vest.Mosk.un.Ser.2: Khim. 17 no.2:23-25 Mr-Ap '62. (MIRA 15:4)

1. Kafedra fizicheskoy khimii Moskovskogo universiteta.
(Selenium chloride) (Selenium bromide)
(Electron diffraction examination)

40389
S/020/62/145/006/013/015
B106/B144

5.2410
11.2221

AUTHORS: Nikitin, O.T., and Akishin, P. A.

TITLE: Determination of the vaporization heat of boron trioxide by mass spectrometry

PERIODICAL: Akademiya nauk SSSR. Doklady, v. 145, no. 6, 1962, 1294-1296

TEXT: Data on the vaporization heat, ΔH_T, of boron trioxide differ considerably. This is partly due to incomplete removal of water vapor reducing $\Delta H_T(B_2O_3)$ during the measurements. To obtain exact values, the composition and absolute B_2O_3 vapor pressure were determined by mass spectrometry. For 1 - 3 hrs, the sample was kept at 1200°C in vacuo to remove traces of water. After the ion source had been put into the molybdenum effusion chamber, B_2O_3 was dehydrated in the mass spectrometer at ≥1100°C and boron trioxide vapors emerging from the effusion chamber through slits were ionized by electrons of 70 ev. B^+, BO^+, $B_2O_2^+$, and $B_2O_3^+$ ions with the relative intensities 2, 7, 7, and 100, respectively occurred

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